

### **REMARKS / ARGUMENTS**

This application is believed to be in condition for allowance because the claims, as amended, are believed to be non-obvious and patentable over the cited references. The following paragraphs provide the justification for this belief. In view of the following reasoning for allowance, the Applicant hereby respectfully requests further examination and reconsideration of the subject patent application. Note that claim 4 was amended only to correct a typographical error wherein the word "device" was inadvertently misspelled as "deice."

#### **1.0 Amendments to the Specification:**

In the specification of the application, as originally filed, Applicants referenced a related application, referred to by application title, and the use of a "TBD" placeholder with respect to the filing date and serial number of the related application. In particular, the "TBD" placeholder was used in paragraphs [0015] and [0066] since, at the time of filing, the filing date and serial number of the related application were not known.

Specifically, Applicants have amended US Patent Application Publication No. 2005-0169483 A1 (US Application No. 10/772,528) to refer to the copending patent application entitled "SELF-DESCRIPTIVE MICROPHONE ARRAY," having a filing date of 9 February 2004, and assigned Application Serial Number 10/775,371. No new matter is introduced by way of the above described amendments.

#### **2.0 Rejections under 35 U.S.C. §112:**

In the Office Action of July 3, 2007, claim 20 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Office Action correctly identified a typographical error regarding the dependency of claim 20.

In response, Applicants have amended claim 20 such that it now depends from independent claim 15. Note that an additional typographical error was noted in claim 20 wherein the term "external computing device" was inadvertently used instead of the correct term of "remote computing device." Applicants have corrected this typographical error in claim 20 as well as in claim 17. Therefore, Applicants respectfully request reconsideration of the rejection of claim 20 under 35 U.S.C. §112, second paragraph, in view of the aforementioned amendments to claim 20.

### 3.0 Rejections under 35 U.S.C. §103(a):

In the Office Action of July 3, 2007, the following rejections were advanced under 35 U.S.C. §103(a):

- Claims 1-4, 8-11, 15, 16 and 18-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over **Heeden** (US 5,125,260) in view of **Miller** (US 5,029,215).
- Claims 5-7, 12-14, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over **Heeden** in view of **Miller** and further in view of **Komninos** (US 6,058,076).

In order to deem the Applicant's claimed invention unpatentable under 35 U.S.C. §103(a), a prima facie showing of obviousness must be made. However, as fully explained by the M.P.E.P. Section 706.02(j), to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a **reasonable expectation of success**. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations**.

Further, in order to make a prima facie showing of obviousness under 35 U.S.C. 103(a), all of the claimed elements of an Applicant's invention must be considered, especially when they are missing from the prior art. If a claimed element is not taught in the prior art and has advantages not appreciated by the prior art, then no prima facie case of obviousness exists. The Federal Circuit court has stated that it was error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein (*In Re Fine*, 837 F.2d 107, 5 USPQ2d 1596 (Fed. Cir. 1988)).

### 3.1 Rejection of Claims 1-4 and 8:

The Office Action rejected claims 1-4 and 8 under 35 U.S.C. §103(a) based on the rationale that the proposed **Heeden-Miller** combination reference discloses the Applicants claimed system for "...automatically matching preamplifiers in a microphone array..."

In general, the Office Action suggests that the **Heeden** reference discloses the claimed system with the exception of a "preamplifier coupled to each microphone in the microphone arrays." The Office Action then continues by suggesting that the use of preamplifiers is disclosed by the **Miller** reference, with the combination of **Heeden** and **Miller** disclosing the claimed system.

However, Applicants respectfully suggest that the Office Action has incorrectly characterized the claimed system in an attempt to show equivalence to the proposed **Heeden-Miller** combination reference.

For example, it should be noted that in describing the language of the Applicants' claimed system, the Office Action first states that "Heeden discloses a system **for automatically matching responses** in a microphone array..." (emphasis added). However, the language of the claimed system specifically recites a "system for **automatically matching preamplifiers in a microphone array.**" In claim 1, Applicants

do not suggest or claim that any microphones in the microphone array are in any way used or addressed when matching the preamplifiers in that array.

On the other hand, **Heeden** discloses the adjustment of **channel sensitivities** of pressure transducing **microphones over a range of frequencies** for matching an independently calibrated **microphone** to a second microphone (see, for example, the Abstract and column 4, lines 39-66 of the **Heeden** reference).

With respect to the **Miller** reference, the Office Action suggests that **Miller** teaches "...having preamplifiers (410, 411) coupled to each microphone..." The Office Action then continues by suggesting that "the gains of the preamplifiers are adjusted to match the frequency responses **between the microphones in the microphone array**." (emphasis added) Finally, the Office Action concludes in the rejection of claim 1 by suggesting that "...it would have been obvious... to modify Heeden in view of Miller by utilizing the adjustable preamplifier coupled to each microphone... in order to adjust the gain after frequency analysis."

However, in contrast to the position advanced by the Office Action, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference fails to disclose the elements suggested by the Office Action.

For example, as clearly explained by the Office Action, **Miller** operates by adjusting "the gains of the preamplifiers... to match the frequency responses **between the microphones in the microphone array**." This process is illustrated by FIG. 4 of the **Miller** reference which shows a transducer (203) producing a sound signal that is captured by two microphones (201 and 202) that each then send the captured sound to an associated preamplifier (410 and 411, respectively). As noted by the Office Action, **Miller** then adjusts the preamplifier gain to **match the frequency response between the microphones**.

In other words, **Heeden** discloses the adjustment of channel sensitivities of pressure transducing microphones over a range of frequencies for matching an independently calibrated **microphone** to a second microphone, while **Miller** discloses adjusting preamplifier gains to match the frequency response between microphones. Consequently, since both **Heeden** and **Miller** act separately to match microphone responses, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference must also act to match microphone responses.

However, Applicants neither describe nor claim matching channel sensitivities of pressure transducing microphones. Similarly, Applicants neither describe nor claim matching the frequency response between microphones. In fact, Applicants are not evaluating or matching the response of any microphones in the microphones array. Instead, Applicants are directly matching the response of preamplifiers based on a frequency-domain analysis of the measured preamplifier output response to excitation pulses and computing frequency-domain compensation gains for use in matching the output of the preamplifiers. In other words, the proposed **Heeden-Miller** combination reference matches **microphones** while the claimed system operates to match **preamplifiers** independently from the microphones to which those preamplifiers are coupled.

Therefore, in stark contrast to the position advanced by the Office Action, it should be clear that the proposed **Heeden-Miller** combination reference fails completely to disclose the Applicants' claimed system. Consequently, with respect to claim 1, no prima facie case of obviousness has been established in accordance with both the M.P.E.P. Section 706.02(j), and in accordance with the holdings of *In Re Fine*. This lack of a prima facie showing of obviousness means that the rejected claims are patentable under 35 U.S.C. §103(a). Therefore, the Applicants respectfully traverse the rejection of claim 1, and thus request reconsideration of the rejection of claim 1 and dependent claims 2-4 and 8 under 35 U.S.C. §103(a) over the proposed **Heeden-Miller** combination reference in view of the novel language of claim 1, as recited below:

"A system for *automatically matching preamplifiers in a microphone array*, comprising:  
*injecting at least one excitation pulse into each preamplifier* in the microphone array;  
*measuring each preamplifier output response* to each excitation pulse;  
performing a frequency-domain *analysis of the measured preamplifier output response* to each excitation pulse; and  
*computing frequency-domain compensation gains from the results of the frequency-domain analysis for matching the output of each preamplifier.*" (emphasis added)

### **3.2 Rejection of Claims 9-11:**

The Office Action rejected claims 9-11 under 35 U.S.C. §103(a) based on the rationale that the proposed **Heeden-Miller** combination reference discloses the Applicants claimed method for "...automatically *matching preamplifier frequency-domain responses* in a microphone array ..."

In general, the Office Action suggests that the **Heeden** reference discloses the claimed method with the exception of a "preamplifier coupled to each microphone in the microphone arrays," and with the exception of "digitizing the output." The Office Action then continues by suggesting that the use of preamplifiers and performing a digital frequency response analysis is disclosed by the **Miller** reference, with the combination of **Heeden** and **Miller** thus disclosing the claimed method.

However, Applicants respectfully suggest that the Office Action has incorrectly characterized the claimed method in an attempt to show equivalence to the proposed **Heeden-Miller** combination reference.

For example, it should be noted that in describing the language of the Applicants' claimed method, the Office Action first states that "Heeden discloses a system **for automatically matching responses** in a microphone array..." (emphasis added). However, the language of the claimed method specifically recites a method for "...automatically **matching preamplifier frequency-domain responses** in a microphone array ..." In claim 9, Applicants do not suggest or claim that any microphones in the microphone array are in any way used or addressed when matching the preamplifiers in that array.

On the other hand, **Heeden** discloses the adjustment of **channel sensitivities** of pressure transducing **microphones over a range of frequencies** for matching an independently calibrated **microphone** to a second microphone (see, for example, the Abstract and column 4, lines 39-66 of the **Heeden** reference).

With respect to the **Miller** reference, the Office Action suggests that **Miller** teaches "...having preamplifiers (410, 411) coupled to each microphone..." The Office Action then continues by suggesting that "the gains of the preamplifiers are adjusted to match the frequency responses **between the microphones in the microphone array.**" (emphasis added) Finally, the Office Action concludes in the rejection of claim 1 by suggesting that "...it would have been obvious... to modify Heeden in view of Miller by utilizing the adjustable preamplifier coupled to each microphone... in order to adjust the gain after frequency analysis."

However, in contrast to the position advanced by the Office Action, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference fails to disclose the elements suggested by the Office Action.

For example, as clearly explained by the Office Action, **Miller** operates by adjusting "the gains of the preamplifiers... to match the frequency responses **between the microphones in the microphone array.**" This process is illustrated by FIG. 4 of the **Miller** reference which shows a transducer (203) producing a sound signal that is captured

by two microphones (201 and 202) that each then send the captured sound to an associated preamplifier (410 and 411, respectively). As noted by the Office Action, **Miller** then adjusts the preamplifier gain to ***match the frequency response between the microphones***.

In other words, **Heeden** discloses the adjustment of ***channel sensitivities*** of pressure transducing ***microphones over a range of frequencies*** for matching an independently calibrated ***microphone*** to a second microphone, while **Miller** discloses adjusting preamplifier gains to ***match the frequency response between microphones***. Consequently, since both **Heeden** and **Miller** act separately to match microphone responses, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference must also act to ***match microphone responses***.

However, Applicants neither describe nor claim matching ***channel sensitivities*** of pressure transducing ***microphones***. Similarly, Applicants neither describe nor claim matching ***the frequency response between microphones***. In fact, Applicants are not evaluating or matching the response of any microphones in the microphones array. Instead, Applicants are directly matching the output of preamplifiers using frequency-domain compensation gains computed from the output of those preamplifiers in response to analog excitation pulses input directly into those preamplifiers. In other words, the proposed **Heeden-Miller** combination reference matches ***microphones*** while the claimed method operates to match ***preamplifiers*** independently from the microphones to which those preamplifiers are coupled.

Therefore, in stark contrast to the position advanced by the Office Action, it should be clear that the proposed **Heeden-Miller** combination reference fails completely to disclose the Applicants' claimed method. Consequently, with respect to claim 9, no prima facie case of obviousness has been established in accordance with both the M.P.E.P. Section 706.02(j), and in accordance with the holdings of *In Re Fine*. This lack of a prima facie showing of obviousness means that the rejected claims are patentable under 35 U.S.C. §103(a). Therefore, the Applicants respectfully traverse the rejection of claim 9,



and thus request reconsideration of the rejection of claim 9 and dependent claims 10-11 under 35 U.S.C. §103(a) over the proposed **Heeden-Miller** combination reference in view of the novel language of claim 9, as recited below:

“A method for ***automatically matching preamplifier frequency-domain responses*** in a microphone array, comprising using a computing device to:

generate at least one analog excitation pulse of a predetermined phase, magnitude and duration and provide the at least one generated analog ***excitation pulse to an input of each preamplifier*** in a microphone array;

digitize an output resulting from each excitation pulse for each preamplifier in the microphone array;

perform a ***frequency-domain analysis of the digitized output for each preamplifier*** in the microphone array; and

compute ***frequency-domain compensation gains from the results of the frequency-domain analysis for matching the output of each preamplifier*** in the microphone array with each other.” (emphasis added)

### **3.3 Rejection of Claims 15-16 and 18-20:**

The Office Action rejected claims 15, 16 and 18-20 under 35 U.S.C. §103(a) based on the rationale that the proposed **Heeden-Miller** combination reference discloses the Applicants claimed system for “...automatically calibrating preamplifiers in a microphone array ***to provide matched preamplifier outputs ...***”

In general, the Office Action suggests that the **Heeden** reference discloses the claimed system with the exception of a “preamplifier coupled to each microphone in the microphone arrays,” and with the exception of “digitizing the output.” The Office Action then continues by suggesting that the use of preamplifiers and performing a digital

frequency response analysis is disclosed by the *Miller* reference, with the combination of *Heeden* and *Miller* thus disclosing the claimed system.

However, Applicants respectfully suggest that the Office Action has incorrectly characterized the claimed method in an attempt to show equivalence to the proposed *Heeden-Miller* combination reference.

For example, it should be noted that in describing the language of the Applicants' claimed method, the Office Action first states that "Heeden discloses a system *for automatically matching responses* in a microphone array..." (emphasis added). However, the language of the claimed method specifically recites a method for "...automatically *calibrating preamplifiers in a microphone array to provide matched preamplifier outputs*..." In claim 15, Applicants do not suggest or claim that any microphones in the microphone array are in any way used or addressed when matching the preamplifiers in that array.

On the other hand, *Heeden* discloses the adjustment of *channel sensitivities* of pressure transducing *microphones over a range of frequencies* for matching an independently calibrated *microphone* to a second microphone (see, for example, the Abstract and column 4, lines 39-66 of the *Heeden* reference).

With respect to the *Miller* reference, the Office Action suggests that *Miller* teaches "...having preamplifiers (410, 411) coupled to each microphone..." The Office Action then continues by suggesting that "the gains of the preamplifiers are adjusted to match the frequency responses *between the microphones in the microphone array*." (emphasis added) Finally, the Office Action concludes in the rejection of claim 1 by suggesting that "...it would have been obvious... to modify Heeden in view of Miller by utilizing the adjustable preamplifier coupled to each microphone... in order to adjust the gain after frequency analysis."

However, in contrast to the position advanced by the Office Action, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference fails to disclose the elements suggested by the Office Action.

For example, as clearly explained by the Office Action, **Miller** operates by adjusting "the gains of the preamplifiers... to match the frequency responses between the microphones in the microphone array." This process is illustrated by FIG. 4 of the **Miller** reference which shows a transducer (203) producing a sound signal that is captured by two microphones (201 and 202) that each then send the captured sound to an associated preamplifier (410 and 411, respectively). As noted by the Office Action, **Miller** then adjusts the preamplifier gain to *match the frequency response between the microphones.*

In other words, **Heeden** discloses the adjustment of channel sensitivities of pressure transducing microphones over a range of frequencies for matching an independently calibrated microphone to a second microphone, while **Miller** discloses adjusting preamplifier gains to match the frequency response between microphones. Consequently, since both **Heeden** and **Miller** act separately to match microphone responses, Applicants respectfully suggest that the proposed **Heeden-Miller** combination reference must also act to match microphone responses.

However, Applicants neither describe nor claim matching channel sensitivities of pressure transducing microphones. Similarly, Applicants neither describe nor claim matching the frequency response between microphones. In fact, Applicants are not evaluating or matching the response of any microphones in the microphones array. Instead, Applicants are directly matching the output of preamplifiers using frequency-domain compensation gains computed from the output of those preamplifiers in response to analog excitation pulses input directly into those preamplifiers. In other words, the proposed **Heeden-Miller** combination reference matches **microphones** while the claimed system operates to match **preamplifiers** independently from the microphones to which those preamplifiers are coupled.

Therefore, in stark contrast to the position advanced by the Office Action, it should be clear that the proposed **Heeden-Miller** combination reference fails completely to disclose the Applicants' claimed system. Consequently, with respect to claim 15, no prima facie case of obviousness has been established in accordance with both the M.P.E.P. Section 706.02(j), and in accordance with the holdings of *In Re Fine*. This lack of a prima facie showing of obviousness means that the rejected claims are patentable under 35 U.S.C. §103(a). Therefore, the Applicants respectfully traverse the rejection of claim 15, and thus request reconsideration of the rejection of claim 15 and dependent claims 16 and 18-20 under 35 U.S.C. §103(a) over the proposed **Heeden-Miller** combination reference in view of the novel language of claim 15, as recited below:

"A system for automatically **calibrating preamplifiers in a microphone array to provide matched preamplifier outputs**, comprising:  
a microphone array including at least one microphone, each microphone further including at least one preamplifier;  
said microphone array further including a **switchable pulse generation circuit** for generating excitation pulses of a predetermined duration, magnitude and phase;  
remotely initiating generation of at least one excitation pulse in the switchable pulse generation circuit from a remote computing device coupled to the microphone array via a computer interface;  
automatically injecting **each excitation pulses into each preamplifier;**  
**measuring an output resulting from each injected excitation pulse for each preamplifier;**  
**providing the measured output for each preamplifier to the remote computing device** via the computer interface;  
on the remote computing device, performing a frequency-domain analysis of the measured output for each preamplifier; and  
**computing frequency-domain compensation gains from the results of the frequency-domain analysis for matching the output of**

*each preamplifier* in the microphone array with each other.” (emphasis added)

### 3.4 Rejection of Claims 5-7, 12-14, and 17:

The Office Action rejected claims 5-7, 12-14, and 17 under 35 U.S.C. §103(a) based on the rationale that the proposed **Heeden-Miller-Komninos** combination reference discloses the Applicants claimed systems and methods. However, as discussed above in Sections 3.1 through 3.3, the parent claims (i.e., claims 1, 9 and 15) of dependent claims 5-7, 12-14, and 17 have been shown to be allowable in view of the proposed **Heeden-Miller** combination reference. Therefore, the use of the **Komninos** reference in an attempt to address particular features of dependent claims 5-7, 12-14 fails to show a prima facie case of obviousness as required under 35 U.S.C. §103(a). Therefore, the Applicants respectfully traverse the rejection of claims 5-7, 12-14, and 17, and thus request reconsideration of these claims in view of the patentability of their respective parent claims, as discussed above.

**CONCLUSION**

In view of the above, it is respectfully submitted that claims 1-24, as amended, are in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of claims 1-24 and to pass this application to issue. Additionally, in an effort to further the prosecution of the subject application, the Applicant kindly invites the Examiner to telephone the Applicant's attorney at (805) 278-8855 if the Examiner has any questions or concerns.

Respectfully submitted,



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